

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~striketthrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims 1, 12, 19, 33 and 38-41 and CANCEL claim 32, without prejudice or disclaimer, in accordance with the following:

1. **(Currently Amended)** A lithium-sulfur battery comprising:
 - a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;
 - a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and
 - an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents;
 - wherein the mixed organic solvents of said electrolyte ~~comprise at least~~consist of three different solvents, a weak polar solvent, which is capable of dissolving elemental sulfur, a strong polar solvent, which is capable of dissolving lithium polysulfide, and a lithium protection solvent, which forms a good protective layer on a lithium surface,
 - wherein the weak polar solvent has a dielectric coefficient of less than 15 and ~~comprises~~consists of dimethoxyethane, the strong polar solvent ~~comprises~~consists of sulfolane, and
 - the lithium protection solvent ~~comprises 1,3-dioxolane~~consists of 1,3-dioxolane, and
 - wherein a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 3:1:1.

2-7 **(Cancelled)**

8. **(Previously Presented)** The lithium-sulfur battery according to claim 1, wherein said positive electrode further comprises at least one additive selected from the group

consisting of a transition metal, a Group IIIA element, a Group IVA element, a sulfur compound thereof, and an alloy thereof.

9. **(Previously Presented)** The lithium-sulfur battery according to claim 8, wherein the positive electrode further comprises a transition metal selected from the group consisting of Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, Ta, W, Re, Os, Ir, Pt, Au and Hg.

10. **(Previously Presented)** The lithium-sulfur battery according to claim 8, wherein the positive electrode further comprises a Group IIIA element selected from the group consisting of Al, Ga, In and Tl.

11. **(Previously Presented)** The lithium-sulfur battery according to claim 1, wherein the sulfur-containing electrolyte salt is lithium trifluoromethane sulfonimide.

12. **(Currently Amended)** A lithium-sulfur battery comprising:
a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;
a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and
an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents, wherein the mixed organic solvents ~~comprise~~consist of three different solvents, a weak polar solvent, a strong polar solvent, and a lithium protection solvent, wherein the weak polar solvent ~~comprise~~consists of dimethoxyethane, the strong polar solvent ~~comprise~~consists of sulfolane, and the lithium protection solvent ~~comprise~~consists of 1, 3-dioxolane, and a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 2:2:1.

13. **(Previously Presented)** The lithium-sulfur battery according to claim 12, wherein said positive electrode further comprises at least one additive selected from the group

consisting of a transition metal, a Group IIIA element, a Group IVA element, a sulfur compound thereof, and an alloy thereof.

14. **(Previously Presented)** The lithium-sulfur battery according to claim 13, wherein the positive electrode further comprises a transition metal selected from the group consisting of Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, Ta, W, Re, Os, Ir, Pt, Au and Hg.

15. **(Previously Presented)** The lithium-sulfur battery according to claim 13, wherein the positive electrode further comprises a Group IIIA element selected from the group consisting of Al, Ga, In and Tl.

16. **(Previously Presented)** The lithium-sulfur battery according to claim 12, wherein the sulfur-containing electrolyte salt is lithium trifluoromethane sulfonimide.

17-18 **(Cancelled)**

19. **(Currently Amended)** An electrolyte for use in a lithium sulfur battery having electrodes, the electrolyte comprising:

- a weak polar solvent, which dissolves polysulfides having an oxidation number of sulfur that is near 0,
- a strong polar solvent, which dissolves polysulfides having an oxidation number of sulfur between 0 and -1, and
- a lithium protection solvent, which forms a stable solid-electrolyte interface on a lithium surface of one of the electrodes; and
- a sulfur-containing electrolyte salt,

wherein the weak polar solvent has a dielectric coefficient of less than 15 and ~~comprises~~consists of dimethoxyethane, the strong polar solvent ~~comprises~~consists of sulfolane, and the lithium protection solvent ~~comprises~~consists of 1,3-dioxolane, and

a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 3:1:1.

20. **(Original)** The electrolyte according to claim 19, wherein the weak polar

solvent is capable of dissolving elemental sulfur, and the strong polar solvent is capable of dissolving lithium polysulfide.

21-32. (Cancelled)

33. (Currently Amended) A method of manufacturing a lithium-sulfur battery, comprising:

preparing a slurry comprising a conductive material, an organic binder, and a sulfur-based compound;

coating the slurry on a current collector to form a positive electrode;

providing a negative electrode including a negative active material including a negative active material selected from the group consisting of a material in which lithium intercalation reversibly occurs, a lithium alloy and a lithium metal;

providing an electrolyte comprising a sulfur-containing electrolyte salt and mixed organic solvents, wherein the mixed organic solvents of said electrolyte ~~comprise at least~~ consist of three different solvents, a weak polar solvent, which is capable of dissolving elemental sulfur, a strong polar solvent, which is capable of dissolving lithium polysulfide, and a lithium protection solvent, which forms a good protective layer on a lithium surface; and

placing the electrolyte between the positive and negative electrode using a separator to form the lithium-sulfur battery,

wherein the weak polar solvent has a dielectric coefficient of less than 15 and ~~comprises~~ consists of dimethoxyethane, the strong polar solvent ~~comprises~~ consists of sulfolane, and the lithium protection solvent ~~comprises~~ consists of 1,3-dioxolane, and

a volume ratio of the weak polar solvent to the strong polar solvent to the lithium protection solvent is 3:1:1.

34-35. (Cancelled)

36. (Previously Presented) The lithium-sulfur battery according to claim 8, wherein the positive electrode further comprises a Group IVA element selected from the group consisting of Si, Ge, Sn and Pb.

37. (Previously Presented) The lithium-sulfur battery according to claim 13, wherein the positive electrode further comprises a Group IVA element selected from the group

consisting of Si, Ge, Sn and Pb.

38. **(Currently Amended)** A lithium-sulfur battery comprising:

a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;

a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and

an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents; the mixed organic solvents comprising consist of a weak polar solvent, first and second strong polar solvents, and a lithium protection solvent,

wherein the weak polar solvent comprises consists of dimethoxyethane, the first strong polar solvent comprises consists of sulfolane, the second strong polar solvent comprises consists of dimethylsulfoxide, and the lithium protection solvent comprises consists of 1,3-dioxolane, and

a volume ratio of the weak polar solvent to the first strong polar solvent to the second strong polar solvent to the lithium protection solvent is 20:16:4:10.

39. **(Currently Amended)** A lithium-sulfur battery comprising:

a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;

a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and

an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents; the mixed organic solvents comprising consist of first and second weak polar solvents, a strong polar solvent, and a lithium protection solvent,

wherein the first weak polar solvent comprises consists of dimethoxyethane, the second weak polar solvent comprises consists of methyltetrahydrofurane, the strong polar solvent comprises consists of sulfolane, and the lithium protection solvent comprises consists of 1,3-dioxolane, and

a volume ratio of the first weak polar solvent to the second weak polar solvent to the strong polar solvent to the lithium protection solvent is 16:4:20:10.

40. **(Currently Amended)** A lithium-sulfur battery comprising:

a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;

a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and

an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents; the mixed organic solvents comprisingconsists of a weak polar solvent, a strong polar solvent, and first and second lithium protection solvents,

wherein the weak polar solvent comprisesconsists of dimethoxyethane, the first lithium protection solvent comprisesconsists of 3,5-dimethylisoxazole, the strong polar solvent comprisesconsists of sulfolane, and the second lithium protection solvent comprisesconsists of 1,3-dioxolane, and

a volume ratio of the weak polar solvent to the first lithium protection solvent to the strong polar solvent to the second lithium protection solvent is 4:1:4:1.

41. **(Currently Amended)** A lithium-sulfur battery comprising:

a negative electrode including a negative active material selected from the group consisting of materials in which lithium intercalation reversibly occurs, a lithium alloy, and a lithium metal;

a positive electrode including a positive active material comprising at least one sulfur-based compound selected from the group consisting of elemental sulfur and organosulfur compounds, and an electrically conductive material; and

an electrolyte including a sulfur-containing electrolyte salt and mixed organic solvents; the mixed organic solvents comprisingconsist of first and second weak polar solvents, a strong polar solvent, and a lithium protection solvent,

wherein the first weak polar solvent comprisesconsists of dimethoxyethane, the second weak polar solvent comprisesconsists of diglyme, the strong polar solvent comprisesconsists of sulfolane, and the lithium protection solvent comprisesconsists of 1,3-dioxolane, and

a volume ratio of the first weak polar solvent to the second weak polar solvent to the strong polar solvent to the lithium protection solvent is 2:2:1:5.